INTERNATIONAL STANDARD

ISO 140-5

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Acoustics — Measurement of sound insulation in buildings and of building elements —

Part 5:
Field measurements of airborne sound insulation of façade elements and façades

Acoustique — Mesurage de l'isolation acoustique des immeubles et des éléments de construction —

Partie 5: Mesurages in situ de la transmission des bruits aériens par les éléments de façade et les façades

Reference number
ISO 140-5:1998(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 140-5 was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 2, *Building acoustics*.

This second edition cancels and replaces the first edition (ISO 140-5:1978), which has been technically revised.

ISO 140 consists of the following parts, under the general title *Acoustics — Measurement of sound insulation in buildings and of building elements:*

— *Part 1: Requirements of laboratory test facilities with suppressed flanking transmission*

— *Part 2: Determination, verification and application of precision data*

— *Part 3: Laboratory measurement of airborne sound insulation of building elements*

— *Part 4: Field measurements of airborne sound insulation between rooms*

— *Part 5: Field measurements of airborne sound insulation of façade elements and façades*

— *Part 6: Laboratory measurements of impact sound insulation of floors*

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— *Part 7: Field measurements of impact sound insulation of floors*

— *Part 8: Laboratory measurements of the reduction of transmitted impact noise by floor coverings on a heavyweight standard floor*

— *Part 9: Laboratory measurement of room-to-room airborne sound insulation of a suspended ceiling with a plenum above it*

— *Part 10: Laboratory measurement of airborne sound insulation of small building elements*

Annexes A and B form an integral part of this part of ISO 140. Annexes C to F are for information only.

Acoustics — Measurement of sound insulation in buildings and of building elements —

Part 5:
Field measurements of airborne sound insulation of façade elements and façades

1 Scope

This part of ISO 140 specifies two series of methods (element methods and global methods) for measurement of the airborne sound insulation of façade elements and whole façades, respectively. The element methods aim to estimate the sound reduction index of a façade element, for example a window. The most accurate element method uses a loudspeaker as an artificial sound source. Other, less accurate, element methods use available traffic noise. The global methods, on the other hand, aim to estimate the outdoor/indoor sound level difference under actual traffic conditions. The most accurate global methods use the actual traffic as sound source. In addition, a loudspeaker may be used as an artificial sound source. An overview of the methods is given in table 1.

The element loudspeaker method yields an apparent sound reduction index which, under certain circumstances [e.g. taking account of measurement precision (see 7.1)], can be compared with the sound reduction index measured in laboratories in accordance with ISO 140-3 or ISO 140-10. This method is the preferred method when the aim of the measurement is to evaluate the performance of a specified façade element in relation to its performance in the laboratory.

The element road traffic method will serve the same purposes as the element loudspeaker method. It is particularly useful when, for different practical reasons, the element loudspeaker method cannot be used. These two methods will often yield slightly different results. The road traffic method tends to result in lower values of the sound reduction index than the loudspeaker method. In annex D this road traffic method is supplemented by the corresponding aircraft and railway traffic methods.

The global road traffic method yields the real reduction of a façade in a given place relative to a position 2 m in front of the façade. This method is the preferred method when the aim of the measurement is to evaluate the performance of a whole façade, including all flanking paths, in a specified position relative to nearby roads. The result cannot be compared with that of laboratory measurements.

The global loudspeaker method yields the sound reduction of a façade relative to a position 2 m in front of the façade. This method is particularly useful when, for different practical reasons, the real noise source cannot be used. The result cannot be compared with that of laboratory measurements.

Table 1 — Overview of the different measurement methods

No.	Method	Reference	Result	Field of application
	Element			
1	Element loudspeaker	Clause 5	$R'_{45°}$	Preferred method to estimate the apparent sound reduction index of façade elements
2	Element road traffic	Clause 6	$R'_{tr,s}$	Alternative to method No.1 when road traffic noise of sufficient level is available
3	Element railway traffic	Annex D (informative)	$R'_{rt,s}$	Alternative to method No.1 when railway traffic noise of sufficient level is available
4	Element air traffic	Annex D (informative)	$R'_{at,s}$	Alternative to method No.1 when air traffic noise of sufficient level is available
	Global			
5	Global loudspeaker	Clause 5	$D_{ls,2m,nT}$ $D_{ls,2m,n}$	Alternative to methods Nos. 6, 7 and 8
6	Global road traffic	Clause 6	$D_{tr,2m,nT}$ $D_{tr,2m,n}$	Preferred method to estimate the global sound insulation of a façade exposed to road traffic noise
7	Global railway traffic	Annex D (informative)	$D_{rt,2m,nT}$ $D_{rt,2m,n}$	Preferred method to estimate the global sound insulation of a façade exposed to railway traffic noise
8	Global air traffic	Annex D (informative)	$D_{at,2m,nT}$ $D_{at,2m,n}$	Preferred method to estimate the global sound insulation of a façade exposed to air traffic noise

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 140. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 140 are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below. Members of IEC and ISO maintain registers of currently valid international standards.

ISO 140-2:1991, *Acoustics — Measurement of sound insulation in buildings and of building elements — Part 2: Determination, verification and application of precision data.*

ISO 140-3:1995, *Acoustics — Measurement of sound insulation in buildings and of building elements — Part 3: Laboratory measurements of airborne sound insulation of building elements.*

ISO 354:1985, *Acoustics — Measurement of sound absorption in a reverberation room.*

ISO 717-1:1996, *Acoustics — Rating of sound insulation in buildings and of building elements — Part 1: Airborne sound insulation.*

IEC 60651:1979, *Sound level meters.*

IEC 60804:1985, *Integrating-averaging sound level meters.*

IEC 60942:1991, *Sound calibrators.*

IEC 61260:1995, *Electroacoustics — Octave band filters and fractional — Octave band filters.*